What is claimed is:

1. A system for receiving a signal, comprising:

an antenna adapted to receive a signal, the signal being decomposable into first and second CDMA signal segments attributable to first and second emitters, respectively; and

projecting means for determining the first CDMA signal segment, the first CDMA signal segment spanning a first signal space, the projecting means being in communication with the antenna and determining the first CDMA signal segment by projecting a signal space spanned by the signal onto the first signal space, wherein the first signal space is orthogonal to a space that corresponds to an interference code matrix for the second CDMA signal segment.

2. The system of Claim 1, wherein the signal space is obliquely projected onto the first signal space along a second signal space spanned by the second signal segment.

3. The system of Claim 1, wherein the system includes:

a) a plurality of antennas, each of which receives at least a portion of the signal, and

b) a plurality of projecting means corresponding with the plurality of antennas and being in communication therewith, each of the plurality of projecting means being adapted to determine by projection the first CDMA signal segment of the respective signal portion received by the corresponding antenna.

4. The system of Claim 3, including a plurality of RAKE processors corresponding with the plurality of projecting means, wherein each of the plurality of projecting means produces a respective projecting means output which is received as a RAKE processor input by each of the plurality of projecting means' corresponding RAKE processor, the respective output of each of the plurality of projecting means being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale its respective input to produce a compensated output.

5. The system of Claim 4, wherein the compensated output of each of the plurality of RAKE processors is delivered to a summing correlator.

6. The system of Claim 1, further including a RAKE processor having a RAKE input, wherein the projecting means produces a projecting means output which is coupled to the RAKE input.

7. The system of Claim 1, wherein the first CDMA signal segment comprises a plurality of multipath signal segments and the projecting means outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

threshold detecting means, in communication with the projecting means, for generating timing information defining a temporal relationship among the plurality of peaks.

8. The system of Claim 7, wherein the system comprises a plurality of projecting means and a plurality of antennas in communication with a corresponding threshold detecting means and further comprising:

timing reconciliation means for determining a reference time based on timing information received from each of the threshold detecting means.

9. The system of Claim 8, further comprising:

a RAKE processing means, in communication with each of the projecting means and the timing reconciliation means, for aligning the plurality of multipath signal segments in at least one of time and phase as a function of at least one of the magnitudes of the plurality of multipath signal segments, the reference time, and the phase, the phased RAKE means outputting an aligned first signal.

10. The system of Claim 9, further comprising:

a plurality of RAKE processing means, each RAKE processing means being in communication with a corresponding one of the plurality of antennas and producing a corresponding aligned first signal attributable to the first emitter; and

a demodulating means, in communication with the plurality of RAKE processing means, for demodulating at least a portion of each corresponding aligned first signal, the at least a portion of each corresponding aligned first signal defining a respective aligned first space, the demodulating means determining the respective corresponding aligned first signals by obliquely projecting a respective signal space defined by a corresponding aligned first signal onto the respective aligned first space.

11. A system for receiving a signal, comprising:

an antenna adapted to receive a signal and adapted to generate an output signal, the output signal being decomposable into:

(i) a first CDMA signal portion attributable to a first source, and

(ii) at least one second CDMA signal portion, the at least one second CDMA signal portion being attributable to at least one second source; and,

a projection operator in communication with the antenna for determining the first CDMA signal portion of the output signal, the projection operator being in communication with the antenna and determining the first CDMA signal portion of the output signal by projecting a signal space spanned by the output signal onto a first signal space that corresponds to the first CDMA signal portion, wherein the first signal space is orthogonal to an interference space that corresponds to one or more interference code matrixes corresponding to the at least one second CDMA signal portion.

12. The system of Claim 11, wherein the output signal includes a noise portion and the antenna includes a receiver and at least a portion of the noise portion is generated by the receiver.

13. The system of Claim 12, wherein the projection operator determines the first CMA signal portion by the following equation:

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma^2$$

wherein y corresponds to the output signal, H is related to an interference code matrix of the first source, S is related to an interference code matrix of at least a second source, ^{T} denotes the transpose operation, I denotes the identity matrix, and σ^2 corresponds to the variance of the magnitude of the noise portion.

14. The system of Claim 12, including a plurality of projection operators corresponding to a plurality of antennas and being in communication therewith, each of the plurality of projection operators being adapted to determine a respective first CDMA signal portion of a corresponding portion of the signal received by each of the plurality of antennas and determine the respective first CDMA signal portion of the signal using the equation of Claim 13.

15. The system of Claim 14, including a plurality of RAKE processors in communication with a corresponding one of the plurality of projection operators, wherein each of the plurality of projection operators produces a corresponding projection operator output which is received as a RAKE processor input by its corresponding RAKE processor, the corresponding projection operator output of each of the plurality of projection operators being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale their respective inputs to produce a corresponding compensated output.

16. The system of Claim 15, wherein the corresponding compensated output of each of the plurality of RAKE processors is delivered to a second projection operator in communication therewith for determining a refined first CDMA signal portion of each of the compensated outputs by the equation of Claim 13.

17. The system of Claim 12, wherein the first CDMA signal portion comprises a plurality of multipath signal segments and the projection operator outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

a threshold detector, in communication with the projection operator, for generating timing information defining a temporal relationship among the plurality of peaks.

18. The system of Claim 17, wherein the system comprises a plurality of antennas in communication with a corresponding threshold detector and further comprising:

a timing reconciliation device for determining a reference time based on timing information received from each of the threshold detectors.

19. The system of Claim 18, further comprising:

one or more RAKE processors, in communication with the projection operators and the timing reconciliation device, for aligning the plurality of multipath signal segments in at least one of time and phase based on the magnitudes of the plurality of multipath signal segments and the reference time to form an aligned first CDMA signal.

20. A method for processing a composite signal, the method comprising the steps of:

(a) providing a composite signal that is decomposable into a first CDMA signal portion that is attributable to a first emitter and at least one second CDMA signal that is attributable to a second emitter; and,

(b) obliquely projecting a signal space corresponding to the composite signal onto a first signal space corresponding to the first CDMA signal portion to determine a parameter of the first CDMA signal portion, wherein the first signal space is orthogonal to an interference space that corresponds to an interference code matrix corresponding to the second emitter.

21. The method of Claim 20, wherein the signal space is obliquely projected onto the first signal space along a space that is at least substantially parallel to the interference space.

22. The method of Claim 20, wherein the projecting step determines the magnitude of the first CDMA signal portion and wherein the first and second CDMA signal portions are transmitted asynchronously.

23. The method of Claim 20, wherein the first CDMA signal portion comprises a plurality of multipath signal segments and further comprising:

aligning at least one of a received time and phase of the multipath signal segments to produce an aligned first signal.

24. The method of Claim 23, further comprising:

scaling the multipath signal segments.

25. The method of Claim 20, wherein the first CDMA signal portion comprises a plurality of multipath signal segments, each of the plurality of multipath signal segments being received at different times, and further comprising:

assigning to a portion of each of the plurality of multipath signal segments a respective time of receipt.

26. The method of Claim 25, further comprising:

determining a reference time of receipt based on the respective times of receipt.

27. The method of Claim 25, further comprising:

correlating the plurality of multipath signal segments without regard to the differing times of receipt to form a summated peak magnitude;

aligning the plurality of multipath signal segments relative to the reference time of receipt to form a plurality of aligned signals;

scaling each of the multipath signal segments to form a plurality of scaled signals; and

third summing at least one of the aligned signals and the scaled signals.

28. The method of Claim 22, further comprising:

determining an actual time of transmission of the first CDMA signal portion;

determining an actual received time for the first CDMA signal portion; and

repeating step (b) using an actual time of transmission of the first CDMA signal portion and the actual received time.

29. The method of Claim 20, wherein the projecting step is performed according to the equation:

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma,^2$$

where y corresponds to the composite signal, H is related to an interference code matrix of the first emitter, S is related to an interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix and σ^2 corresponds to the variance of the magnitude of a noise portion of the composite signal.

30. A method for decomposing a composite signal having first and second CDMA signal segments attributable to first and second emitters, respectively comprising:

projecting a signal space spanned by the composite signal onto a first signal space spanned by the first CDMA signal segment to determine a parameter of the first CDMA signal segment, wherein the first signal space is orthogonal to an interference space that corresponds to an interference code matrix associated with the second CDMA signal segment; and

processing the parameter.

31. The method of Claim 30, wherein, in the projecting step, the signal space is obliquely projected onto the first signal space along the interference space.

32. The method of Claim 30, wherein the composite signal includes a second CDMA signal segment attributable to a second emitter other than the first emitter and wherein the first and second CDMA signal segments are transmitted asynchronously.

33. The method of Claim 30, wherein the first CDMA signal segment comprises a plurality of multipath signal segments and further comprising:

aligning at least one of a received time and phase of the multipath signal segments to produce an aligned first signal.

34. The method of Claim 33, further comprising:

scaling the multipath signal segments.

35. The method of Claim 33, wherein the first CDMA signal segment comprises a plurality of multipath signal segments, each of the plurality of multipath signal segments being received at different times, and further comprising:

assigning to a portion of each of the plurality of multipath signal segments a respective time of receipt.

36. The method of Claim 35, further comprising:

determining a reference time of receipt based on the respective times of receipt.

37. The method of Claim 35, further comprising:

correlating the plurality of multipath signal segments without regard to the differing times of receipt to form a summated peak magnitude;

aligning the plurality of multipath signal segments relative to the reference time of receipt to form a plurality of aligned signals;

scaling each of the multipath signal segments to form a plurality of scaled signals; and

third summing at least one of the aligned signals and the scaled signals.

38. The method of Claim 30, further comprising:

determining an actual time of transmission of the first CDMA signal segment;

determining an actual received time for the first CDMA signal segment; and

repeating step (b) using an actual time of transmission of the first CDMA signal segment and the actual received time.

39. The method of Claim 29, wherein the projecting step is performed according to the equation:

$$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS)^{-1}S^T)y)/\sigma,^2$$

where y corresponds to the composite signal, H is related to an interference code matrix of the first emitter, S is related to an interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix and σ^2 corresponds to the variance of the magnitude of a noise portion of the composite signal.

40. A system for processing an output signal of an antenna, the output signal corresponding to a composite signal, comprising:

a projection operator for determining a parameter of an oblique CDMA projection of an output signal of an antenna, the oblique CDMA projection being attributable to an emitter having an interference code matrix and the oblique projection operator determining a parameter of the oblique CDMA projection by projecting obliquely a signal space spanned by the output signal onto a signal space spanned by the oblique CDMA projection and wherein an interference space corresponds to an interference code matrix corresponding to a second CDMA signal segment in the composite signal and the interference space is orthogonal to CDMA signal space spanned by the oblique CDMA projection.

41. The system of Claim 40, wherein the antenna includes a receiver and at least a portion of a noise portion of the output signal is generated by the receiver.

42. The system of Claim 40, including a plurality of projection operators corresponding to a plurality of antennas and being in communication therewith, each of the plurality of projection operators being adapted to determine a respective oblique CDMA projection of a corresponding portion of a respective composite signal received by each of the plurality of antennas and determine the respective oblique CDMA projection of the corresponding output signal by the equation:

$(y^T(I-S(S^TS)^{-1}S^T)H(H^T(I-S(S^TS)^{-1}S^T)H)^{-1}H^T(I-S(S^TS^{-1})S^T)y)/\sigma^2$ where y corresponds to the output signal, H is related to an interference code matrix of the emitter, S is related to an

interference code matrix of at least a second emitter, ^{T} denotes the transpose operation, I denotes the identity matrix, and σ^2 corresponds to the variance of the magnitude of a noise portion of the output signal.

43. The system of Claim 42, including a plurality of RAKE processors in communication with a corresponding one of the plurality of projection operators, wherein each of the plurality of projection operators produces a corresponding projection operator output which is received as a RAKE processor input by each of the plurality of projection operator's corresponding RAKE processor, the corresponding projection operator output of each of the plurality of projection operators being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale their respective inputs to produce a corresponding compensated output.

44. The system of Claim 43, wherein the corresponding compensated output of each of the plurality of RAKE processors is delivered to a second projection operator in communication therewith for determining a refined projection operator of each of the compensated outputs by the equation of Claim 40.

45. The system of Claim 40, wherein the oblique CDMA projection comprises a plurality of multipath signal segments and the projection operator outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

a threshold detector, in communication with the projection operator, for generating timing information defining a temporal relationship among the plurality of peaks.

46. The system of Claim 45, wherein the system comprises a plurality of antennas in communication with a corresponding threshold detector and further comprising:

a timing reconciliation device for determining a reference time based on timing information received from each of the threshold detectors.

47. The system of Claim 46, further comprising:

one or more RAKE processors, in communication with the projection operators and the timing reconciliation device, for aligning the plurality of multipath signal segments in at least one of time and phase based on the magnitudes of the plurality of multipath signal segments and the reference time to form an aligned first signal.

48. A system for processing an output signal of an antenna, the output signal corresponding to a composite signal and being decomposable into a first oblique projection attributable to a first source having an interference code matrix, comprising:

projection means for obliquely projecting a signal space spanned by an output signal onto a first signal space spanned by the first CDMA oblique projection to determine a parameter of the first oblique projection wherein an interference space corresponds to an interference code matrix affiliated with a second CDMA signal segment in the composite signal and the interference space is orthogonal to first signal space spanned by the first signal space.

49. The system of Claim 48, wherein the composite signal is decomposable into the second signal segment, the second signal segment being attributable to a second source other than the first source and wherein the signal space is obliquely projected onto the first signal space along a second signal space corresponding to the second signal segment.

50. The system of Claim 49, wherein the system includes:

a) a plurality of antennas, each of which receives at least a portion of the composite signal, and

b) a plurality of projecting means corresponding with the plurality of antennas and being in communication therewith, each of the plurality of projecting means being adapted to determine by oblique projection the first oblique projection of the respective output signal received by the corresponding antenna.

51. The system of Claim 50, including a plurality of RAKE processors corresponding with the plurality of projecting means, wherein each of the plurality of projecting means produces a respective projecting means output which is received as a RAKE processor input by each of the plurality of projecting means' corresponding RAKE processor, the respective output of each of the plurality of projecting means being delayed relative to one another, each of the plurality of RAKE processors being adapted to align and scale its respective input to produce a compensated output.

52. The system of Claim 51, wherein the compensated output of each of the plurality of RAKE processors is delivered to a summing correlator.

53. The system of Claim 48, further including a RAKE processor having a RAKE input, wherein the projecting means produces a projecting means output which is coupled to the RAKE input.

54. The system of Claim 48, wherein the first oblique projection comprises a plurality of multipath signal segments and the projecting means outputs a correlation function having a plurality of peaks corresponding to the plurality of multipath signal segments, and further comprising:

threshold detecting means, in communication with the projecting means, for generating timing information defining a temporal relationship among the plurality of peaks.

55. The system of Claim 54, wherein the system comprises a plurality of projecting means and a plurality of antennas in communication with a corresponding threshold detecting means and further comprising:

timing reconciliation means for determining a reference time based on timing information received from each of the threshold detecting means.

56. The system of Claim 55, further comprising:

a RAKE processing means, in communication with each of the projecting means and the timing reconciliation means, for aligning the plurality of multipath signal segments in at least one of time and phase as a function of at least one of the magnitudes of the plurality of multipath signal segments, the reference time, and the phase, the phased RAKE means outputting an aligned first signal.

57. The system of Claim 56, further comprising:

a plurality of RAKE processing means, each RAKE processing means being in communication with a corresponding one of the plurality of antennas and producing a corresponding aligned first signal; and

a demodulating means, in communication with the plurality of RAKE processing means, for demodulating at least a portion of each corresponding aligned first signal, the at least a portion of each corresponding aligned first signal defining a respective aligned first space, the demodulating means determining the respective corresponding aligned first signals by obliquely projecting a respective signal space defined by a corresponding aligned first signal onto the respective aligned first space.

58. A method for processing a composite CDMA signal, comprising:

(a) estimating at least one of a time offset, a code offset, and a Doppler offset corresponding to at least one CDMA signal segment;

(b) determining an interference code corresponding to the at least one CDMA signal segment using the at least one of the time offset, code offset and Doppler offset; and

(c) building a space S using the interference code.

59. The method of Claim 58, wherein steps (a) and (b) are repeated for at least one other signal segment and in step (c) a plurality of interference codes are used to build S.

60. The method of Claim 58, further comprising:

(d) estimating at lease one of a time offset, a code offset, and a Doppler offset corresponding to a second CDMA signal segment;

(e) determining a second interference code corresponding to the second CDMA signal segment using the at least one of the time offset, code offset and Doppler offset of step (d);

(f) building a space H using the second interference code; and

(g) determining a projection operator using the S and H spaces.

61. The method of Claim 60, further comprising:

(h) determining a correlation function using the projection operator.